

**GROUND TESTING OF A 10 K SORPTION  
CRYOCOOLER FLIGHT Experiment (BETSCE)**

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The Brilliant Eyes Ten-Kelvin Sorption Cryocooler Experiment (BETSCE) is a Space Shuttle side-wall-mounted experiment designed to mitigate the risk of utilizing 10 K sorption cryocooler technology for spacecraft cryogenic sensor cooling applications. The objectives of the BETSCE are to: (1) demonstrate 10 K sorption cooler technology in a **microgravity** space environment, (2) characterize **spaceflight** performance to develop the flight database needed to support the future cooler development effort, and (3) advance the enabling technologies and develop integration techniques by developing an automated, space flight-worthy instrument. Key technologies and elements to be characterized include hydride **sorbent** beds that reversibly **chemisorb** hydrogen at extreme low pressure ( $< 2 \times 10^{-4}$  MPa) and **desorb** hydrogen at high pressure ( $> 10$  MPa), phase change material, a cryogenic thermal storage device and its high thermal conductance interface to a mechanical cooler upper stage, heat exchangers and other refrigeration loop components, a cold head assembly containing a wicked solid/ liquid cryogen reservoir, cycle process controls, and cycle repeatability.

This paper summarizes ground test results, which demonstrate that the BETSCE instrument meets the functional and Shuttle environmental requirements. The planned **spaceflight** experiment will provide further support for the use of sorption cryocooler technology for **future** long-life, low-vibration, spacecraft sensor cooling applications.

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Prefer Oral Session